Collaborative Electrical Engineering Program at University of Maryland Eastern Shore

Ali Eydgahi

Department of Engineering and Aviation Sciences
University of Maryland Eastern Shore
Princess Anne, MD 21853

Email: aeydgahi@mail.umes.edu

ABSTRACT

This paper describes a Collaborative Engineering Education Model that has recently been implemented under a three-way agreement among University of Maryland Eastern Shore (UMES), Salisbury State University (SSU), and University of Maryland College Park (UMCP). Under this agreement the students at UMES and SSU campuses in a relatively remote location on the Eastern Shore of Maryland can obtain an ABET-accredited professional engineering degree from UMCP without having to relocate from the region. All of the first two years sequence of engineering courses are delivered live at UMES and SSU by faculty members in the Mathematics, Physics/Natural Sciences, and Engineering Programs at the two campuses. Most of the junior and senior level classes are offered over interactive video network (IVN) by UMCP engineering faculty members to UMES and SSU campuses for the students attending the Collaborative Program. All the laboratory courses and capstone designs are taught on-site at UMES.

Introduction

The University of Maryland Eastern Shore has been part of the higher education community since 1886. It is a Land Grant Institution and Historically Black University located in the lower Eastern Shore of Maryland. The student body is about 75% Africa-American and Black and over 51% are female. There are approximately 125 full-time tenured and tenure track faculty, of which 86% have terminal degrees. The campus occupies over 1000 acres. During the last seven years, the campus has been under heavy construction for expansion and improvement of facilities. The student body is continuously increasing in numbers and in quality. Student enrollment has more than doubled in the last twelve years. The university offers Bachelor of Science degrees in twenty-six, Master degrees in six, and Doctor of Philosophy degrees in two programs.

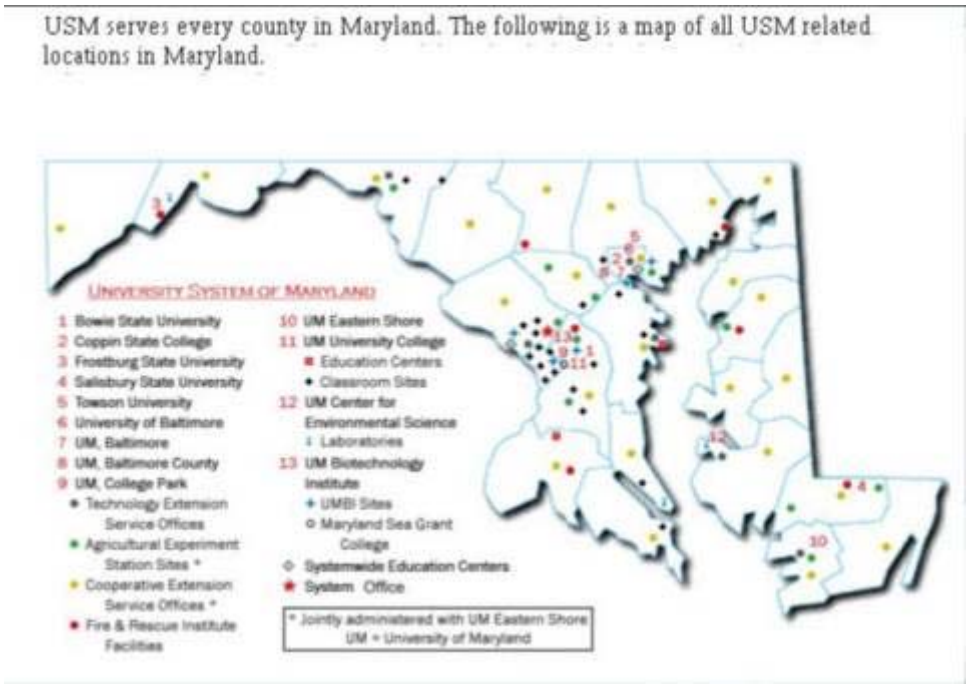
UMES Engineering Program has been offering and continues to offer the first two years of an engineering sequence. All UMES students were required to transfer to UMCP or other engineering schools to complete their engineering degree in the past. However, four-year Electrical Engineering Degree Program has recently been approved under a three-way collaborative agreement among UMES, SSU, and UMCP. Upon successful completion of the Electrical Engineering discipline, the student will receive a Bachelor of Science in EE from College Park. In addition, other engineering programs may be pursued through the five-year UMCP plan for cooperative engineering education which combines classroom theory with career-related work experience.

UMES/SSU/UMCP Collaborative Education Model

This unique program is founded on the premise of sharing resources among the collaborating institutions and builds on the strengths of UMES, SSU, and UMCP. The model combines the advantages of distance education and the conventional teaching environment and provides a unique means of offering quality engineering education to remote locations in the eastern shore of the state of Maryland and serves the needs of minority students that attend UMES.

Under this agreement the students at UMES and SSU campuses in a relatively remote location on the eastern shore of Maryland can obtain an ABET-accredited professional engineering degree from the prestigious Clark's School of Engineering at College Park without having to relocate from the region. The students will be required to take most of the first two years sequence of engineering courses delivered live at UMES and SSU by faculty members in the Mathematics, Physics/Natural Sciences and Engineering Program/Department at the two campuses. Substantial number of the junior and senior level classes will be offered over interactive video network (IVN) by engineering faculty members at College Park to UMES and SSU campuses for the students attending the Collaborative Program. All the laboratory courses will be taught on-site at UMES and SSU.

The Electrical Engineering Program is founded on the basic sciences and emphasizes the development of a high degree of technical competence. It integrates basic sciences, including mathematics, physics, and chemistry; engineering design which applies the science elements into the creation of systems, components and processes while optimizing resources; and humanities and social sciences as a part of the general education requirements. The program lays a broad base for continued learning after college in professional practice, in business and industry, in public service, or in graduate study and research.



Goals of the Program

–

The major goals of the collaborative electrical engineering program are:

- To create a unique means of providing quality engineering education to remote locations on the eastern shore of the state of Maryland
- To utilize and share the resources that exist at the Maryland higher education institutions
- To strengthen the collaborative activities of the UMES, SSU, and UMCP
- To serve the needs of the minority students that attend UMES
- To provide professional development and continuing education opportunities for engineers working in remote areas of the Maryland
- To help the local industry and government agencies by developing engineering potential in the area

Facilities:

To have a successful new engineering program, it is important to develop a climate that fosters professional development and professional activities consistent with the ongoing efforts for restructuring engineering education for the new millennium through modern technologically-based laboratory and computing facilities. Thus, the success of any engineering program depends on quick development of the laboratory facilities to support the experimental work and engineering innovation by the students and faculty.

-

-

i. Interactive Video Network (IVN) Classroom

The Interactive Video Network Classroom consists of interactive video and multimedia equipment, which can transmit compressed digital data between UMES and UMCP through dedicated fiber optic lines. The fiber optic delivery provides two-way real time communication with a satisfactory picture quality . The INV classroom is equipped with video cameras, monitors, microphones, a document camera, a system computer, VCR's, and a telephone line.

ii. Circuit and Electronic Lab

The laboratory is mainly used for courses related to analog and digital electronics, logic circuits, and computer interfacing. The circuit and Electronic laboratory can accommodate ten students, with two per stations. Each station has been outfitted with a Hewlett Packard Oscilloscope, Logic Analyzer, DC variable

voltage power supply, Multimeter, and Frequency/Function generator. At the heart of the setup is a HP Pavilion 9600 Multimedia PC, equipped with a 15" flat screen monitor, Polk Audio speakers, LaserJet printer, and full integration with the campus's internal network. This allows for Internet access and database sharing with other computers. Although the lab is open to all Electrical engineering students, it is primarily used for Junior and Senior level courses.

iii. Computer Lab

The computer lab is equipped with five SUN workstations and a network of fifteen Personal Computers for programming and design applications. Software on the computers includes ProEngineer, Borland C++, PSpice, MATLAB, AUTOCAD, Electronics Workbench, Macromedia Flash, Dreamweaver, and Fireworks.

iv. Advanced Communication Lab

The advanced communication lab is used for junior and senior level laboratory courses in the area of communication and signal processing. There are two stations for performing experiments in digital and analog communication, two stations for Fiber Optics experimentation, two stations for Microwaves, and one station for Telephony. All the stations are equipped for Digital Signal Processing experiments. The stations are equipped with various educational communication modules from LabVolts and measurement and test

equipments from HP. The test equipments in the lab consist of Network Analyzers, Oscilloscopes, Logic Analyzers, DC variable voltage power supplies, Multi-meters, Frequency/Function generators, and PCs.

-

Admission Requirements

The Engineering Program limits enrollment through a selective admission procedure. SAT scores, high school or college grades, and preparation in mathematics and science required for admission to the Engineering Program are substantially higher than those required for admission to UMES.

UMES Freshman or transfer applicants who do not meet the direct admission requirements as engineering majors can be admitted to the department as '*conditional*' engineering majors. These students will be subject to two reviews.

A student must complete all Math courses with a grade of "C" or higher and have a minimum overall GPA of 2.5 for automatic removal of the conditional status on the first review.

Curriculum

The prerequisites, contents, and syllabus of courses in the collaborative electrical engineering program at UMES are exactly the same as their counterparts at UMCP.

The following table shows the recommended course sequence of the program.

RECOMMENDED COURSE SEQUENCE			MAJOR: Electrical Engineering			
FRESHMAN YEAR						
FIRST SEMESTER			GRADE	SECOND SEMESTER			GRADE
CHEM 111H	Chemistry I	4		CHEM 112H	Chemistry II	4	
MATH 112	Calculus I	4		MATH 211	Calculus II	4	
ENES 100	Intro. to Engr. Design	3		PHYS 161	General Physics	3	
ENGL 101	Basic Composition I	3		ENEE 114	Prog. Concepts for Engr.	4	
				ENGL 102	Basic Composition II	3	
TOTAL		14		TOTAL		18	

SOPHOMORE YEAR							
FIRST SEMESTER			GRADE	SECOND SEMESTER			GRADE
MATH 212	Calculus III	4		MATH 321	Differential Equations	4	
PHYS 262	Physics II	4		PHYS 263	Physics III	4	
ENEE 241	Numerical Tech. In Engr.	3		ENEE 204	Basic Circuit Theory	3	
ENEE 244	Digital Logic Design	3		ENEE 206	Digital & Circuits Lab	2	
	General Education	3			General Education	3	
TOTAL		17		TOTAL		16	
JUNIOR YEAR							
FIRST SEMESTER			GRADE	SECOND SEMESTER			GRADE
MATH xxx	Advanced Elective Math	3		ENEE 306	Elect. Circuits Design Lab	2	
ENEE 302	Analog Electronics	3		ENEE 312	Digital Electronics	3	
ENEE 322	Signal & System Theory	3		ENEE 324	Engineering Probability	3	
ENEE 380	Electromagnetic Theory	3		ENEE 350	Computer Organization	3	
	General Education	3		ENEE 381	Elect. Wave Propagation	3	
					General Education	3	
TOTAL		15		TOTAL		17	
SENIOR YEAR							
FIRST SEMESTER			GRADE	SECOND SEMESTER			GRADE
	General Education	6			General Education	3	
	Advanced Elective Lab	2			Advanced Elective Lab	2	
	Technical Electives	9			Technical Electives	9	
TOTAL		17		TOTAL		14	

TOTAL PROGRAM CREDITS 128

*NOTE: Any changes require the Department Head Approval.

Conclusions

The collaborative electrical engineering program at UMES provides students at a remote campus with the opportunity of having the same educational experience and access to the faculty and facilities of a large university. In this program, class sizes are small and students have more access to faculty and facilities. Also, students have advantage of living in small town and therefore have more time for their education.

The collaborative program is an economical solution to extend the educational resources of flagship university to remote areas. The proposal for a collaborative Mechanical Engineering Degree under a similar framework is currently being developed.